

Rhombohedral Hybrid Crystal Semiconductor Device

Completed Technology Project (2013 - 2014)



Project Introduction

Development of a new high speed and high efficiency hybrid crystal structure semiconductor device based on the the recent invention of rhombohedral hybrid crystal epitaxy technology leading the way for fast chipset development using single crystal SiGe.

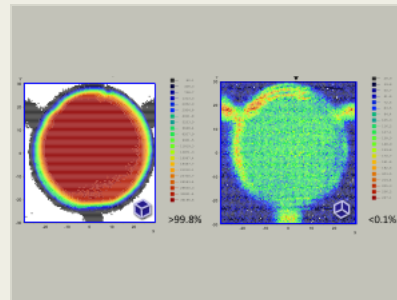
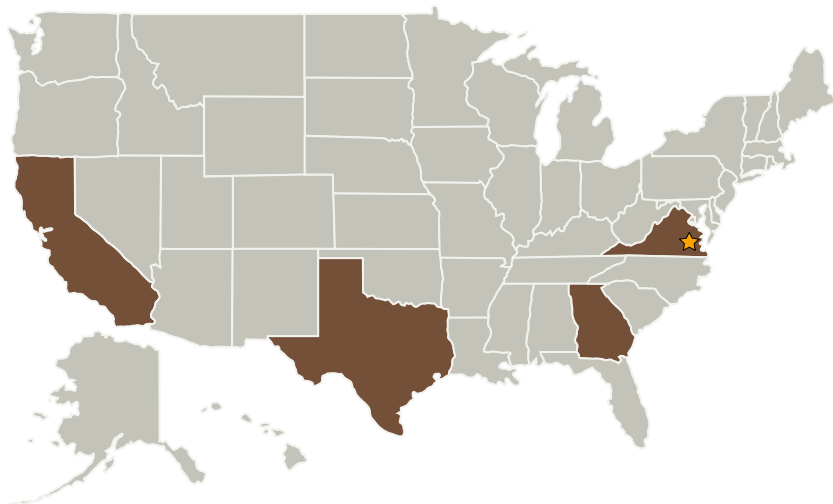
NASA Langley has succeeded in growing a rhombohedrally oriented single crystal SiGe on sapphire substrate. This opens up new challenges in micro-electronics. Since the carrier mobility in single crystal SiGe shows 2.5 (electron) and 5 (hole) times respectively faster than in mono-crystal silicon, the development of ultra fast chipsets is possible to go beyond the bottleneck of data transmission in telemetry system. These results open up new oppotunities to build other electronic application chipsets beyond the prevailing clock frequency based on the miniaturization of the feature size. The research at NASA will eventually lead to collaboration with industries to build ultra-fast chipsets based on our single crystal SiGe wafers.

Anticipated Benefits

Fast and reliable avionics and satellite telemetry systems, radiation-hardened electronics

Avionics and telemetry systems.

Primary U.S. Work Locations and Key Partners



Project Image Rhombohedral Hybrid Crystal Semiconductor Device

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Rhombohedrel Hybrid Crystal Semiconductor Device

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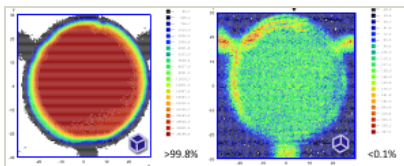


Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia

Co-Funding Partners	Type	Location
Georgia Institute of Technology-Main Campus(GA Tech)	Academia	Atlanta, Georgia
innoEpi Inc.	Industry	
Norfolk State University(NSU)	Academia	Norfolk, Virginia
University of Houston	Academia	Houston, Texas

Primary U.S. Work Locations	
California	Georgia
Texas	Virginia

Images

**12018-1378757629512.png**

Project Image Rhombohedrel Hybrid Crystal Semiconductor Device

(https://techport.nasa.gov/image/2278)

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Independent Research & Development: LaRC IRAD

Project Management

Program Manager:

Julie A Williams-byrd

Project Manager:

Sang H Choi

Principal Investigator:

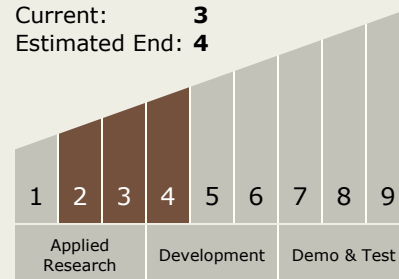
Sang H Choi

Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 4



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Links

Patent Link 1
(no url provided)

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.5 Hybrids